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Post-Cerro Grande Fire Environmental Sampling Data: Pueblo Canyon Surface Water Samples Collected in June 2000

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Acronyms

ER	environmental restoration
WQCC	Water Quality Control Commission

1.0 INTRODUCTION

The Los Alamos National Laboratory's (the Laboratory's) Environmental Restoration (ER) Project collected surface water samples from four locations in Pueblo Canyon on June 17, 2000 (after the Cerro Grande fire). This report summarizes the analytical results of these sampling efforts.

Sampling was conducted before the summer monsoon season and before significant postfire flooding occurred in Pueblo Canyon. This sampling provided baseline data for later comparison with data from samples collected during the monsoon season, because the chemistry of the floodwater could affect water quality in the canyon. For more information, see the conceptual model at http://erproject.lanl.gov/Fire/Data/datahome.html#CE_Model. The surface water locations were selected to represent potential spatial variability in water quality in Pueblo Canyon, and were chosen from locations with persistent surface water.

2.0 SAMPLING AND ANALYSIS

Sampling

Surface water samples were collected at four locations in upper Pueblo Canyon east of Diamond Drive (Figure 2.0-1). Two of the sampling locations are between the Pueblo Canyon land bridge and the confluence of Pueblo Canyon and Acid Canyon. The third location is in the vicinity of alluvial well PAO-1(a), approximately 1000 ft west of the confluence of Pueblo Canyon and Acid Canyon. The fourth location is in the vicinity of alluvial well PAO-2, approximately 500 ft east of the confluence of Pueblo Canyon and Acid Canyon. Potential sources of this surface water include the June 2, 2000, rainfall event and local runoff from townsite and county activities. Some of this surface water may have remained or been affected by the May 2000 fire-fighting effort in the townsite.

Both filtered and nonfiltered water samples were collected to characterize the difference in results caused by the presence of suspended solids. Filtered samples are used to evaluate the dissolved chemicals in samples. Nonfiltered samples are used to evaluate chemicals associated with the suspended sediment, in addition to the dissolved chemicals. Filtered samples were prepared in the field by filtration through a 0.45-micron filter. All water samples were analyzed by analytical laboratories that are approved by the ER Project and that are external to the Laboratory.

The first major storm event after the Cerro Grande fire occurred on June 2, 2000. That event did cause a flood in Pueblo Canyon; therefore some ash-related chemicals and fire-fighting chemicals may be present in these samples. Because some chemicals or chemical concentrations not related to Laboratory operations have been identified in ash and flood-transported ash (muck), these sampling results should be evaluated in that context. Data summaries for baseline ash and muck samples collected by the ER Project in June 2000 are provided at <http://erproject.lanl.gov/Fire/Data/ash-muck.html>.

Analysis

All filtered and nonfiltered samples were analyzed for the following inorganic chemicals and radionuclides: 24 trace metals, uranium, ammonia, nitrite and nitrate, total phosphorus, americium-241, isotopic plutonium (plutonium-238 and plutonium-239), isotopic uranium (uranium-234, uranium-235, and uranium-238), and strontium-90.

Only filtered samples were analyzed for the following chemicals: bicarbonate, carbonate, chloride, fluoride, and sulfate.

Only nonfiltered samples were analyzed for the following chemicals: organochlorine pesticides, polychlorinated biphenyl compounds, semivolatile organic compounds, total cyanide, gamma-emitting radionuclides, and tritium.

One nonfiltered sample also was analyzed for dioxins and furans.

3.0 DATA SUMMARY TABLES

The inorganic and radionuclide chemical data for the water samples are summarized in two separate tables (Tables 3.0-1 and 3.0-2, respectively). Each table lists the chemical analyte, the number of samples analyzed, the number of detected results, and the minimum, mean, and maximum value for the detected results. No organic compounds were detected in any of the samples; therefore, no summary table is provided for organic compounds.

The surface water results are compared with New Mexico Water Quality Control Commission (WQCC) surface water standards for livestock watering (Section 3100K) and wildlife habitat (Section 3100L). Livestock watering and wildlife habitat are New Mexico Environment Department-designated uses for surface water in the Pueblo Canyon, as well as other canyons at the Laboratory. Some standards apply only to filtered samples, and some standards apply only to nonfiltered samples. The New Mexico WQCC standards for interstate and intrastate streams are available under "Environmental Protection Regulations, Regulations by Subject, Standards for Interstate and Intrastate Streams--20NMAC6.1," at <http://www.nmenv.state.nm.us/>.

The WQCC Standards are used only as screening levels for the purposes of reviewing the surface water sample results. An exceedance of its screening level by a chemical does not necessarily mean that immediate action is necessary; an exceedance means only that further evaluation should be undertaken. That evaluation may include additional sample collection leading to a risk assessment, in order to accurately assess the potential risk from exposure.

4.0 REFERENCES

NMED (New Mexico Environment Department), Environmental Protection Regulations, Regulations by Subject, Standards for Interstate and Intrastate Streams--20NMAC6.1, <http://www.nmenv.state.nm.us/>.

Environmental Restoration Project, <http://erproject.lanl.gov/Fire/Data/ash-muck.html>.

Table 3.0-1
Pueblo Canyon Surface Water Samples, June 2000: Data Summary for Inorganic Parameters

Analyte	Field Preparation	Number of Analyses	Number of Detects	Minimum of Detects (µg/L)	Mean of Detects (µg/L)	Maximum of Detects (µg/L)	NMED ^a Livestock Watering Standard ^b (µg/L)	Frequency of Detects > Livestock Watering Standard	NMED Wildlife Habitat Standard ^b (µg/L)	Frequency of Detects > Wildlife Habitat Standard
Aluminum	F ^c	4	0	— ^d	—	—	5000	—	—	—
Aluminum	NF ^e	4	3	55.2	139.4	290	—	—	—	—
Ammonia (expressed as N)	F	4	2	150	165	180	—	—	—	—
Ammonia (expressed as N)	NF	4	4	120	175	220	—	—	—	—
Antimony	F	4	0	—	—	—	—	—	—	—
Antimony	NF	4	0	—	—	—	—	—	—	—
Arsenic	F	4	4	0.52	1.16	1.8	200	0/4	—	—
Arsenic	NF	4	4	0.64	1.51	2.2	—	—	—	—
Barium	F	4	4	60.2	72.7	85.8	—	—	—	—
Barium	NF	4	4	64.6	83.4	94.6	—	—	—	—
Beryllium	F	4	1	0.01	0.01	0.01	—	—	—	—
Beryllium	NF	4	3	0.012	0.027	0.041	—	—	—	—
Bicarbonate	F	4	4	99000	99750	100000	—	—	—	—
Boron	F	4	0	—	—	—	5000	0/4	—	—
Boron	NF	4	0	—	—	—	—	—	—	—
Cadmium	F	4	1	0.136	0.136	0.136	50	0/4	—	—
Cadmium	NF	4	1	0.171	0.171	0.171	—	—	—	—
Calcium	F	4	4	26200	29250	37100	—	—	—	—
Calcium	NF	4	4	27100	29850	36700	—	—	—	—

Table 3.0-1 (continued)

Analyte	Field Preparation	Number of Analyses	Number of Detects	Minimum of Detects (µg/L)	Mean of Detects (µg/L)	Maximum of Detects (µg/L)	NMED Livestock Watering Standard (µg/L)	Frequency of Detects > Livestock Watering Standard	NMED Wildlife Habitat Standard (µg/L)	Frequency of Detects > Wildlife Habitat Standard
Carbonate	F	4	0	—	—	—	—	—	—	—
Chloride	F	4	4	39000	45750	65000	—	—	—	—
Chromium	F	4	4	0.6	0.69	0.78	1000	0/4	—	—
Chromium	NF	4	4	0.76	1.12	2.1	—	—	—	—
Cobalt	F	4	4	0.1	0.5	1.4	1000	0/4	—	—
Cobalt	NF	4	4	0.12	0.70	1.5	—	—	—	—
Copper	F	4	4	1.1	1.6	1.8	500	0/4	—	—
Copper	NF	4	4	1.4	2.0	2.9	—	—	—	—
Cyanide (total)	NF	4	4	1	1.6	2.7	—	—	5.2	0/4
Fluoride	F	4	4	120	163	220	—	—	—	—
Iron	F	4	2	23.4	47.3	71.2	—	—	—	—
Iron	NF	4	4	34.6	281	623	—	—	—	—
Lead	F	4	2	0.011	0.261	0.511	100	0/4	—	—
Lead	NF	4	4	0.324	1.15	2.33	—	—	—	—
Magnesium	F	4	4	4190	4435	4910	—	—	—	—
Magnesium	NF	4	4	4280	4490	4770	—	—	—	—
Manganese	F	4	4	27.7	305	893	—	—	—	—
Manganese	NF	4	4	28	432	940	—	—	—	—
Mercury	F	4	0	—	—	—	—	—	—	—
Mercury	NF	4	0	—	—	—	10	0/4	0.77	0/4
Nickel	F	4	4	0.98	1.72	3	—	—	—	—

Table 3.0-1 (continued)

Analyte	Field Preparation	Number of Analyses	Number of Detects	Minimum of Detects (µg/L)	Mean of Detects (µg/L)	Maximum of Detects (µg/L)	NMED Livestock Watering Standard (µg/L)	Frequency of Detects > Livestock Watering Standard	NMED Wildlife Habitat Standard (µg/L)	Frequency of Detects > Wildlife Habitat Standard
Nickel	NF	4	4	1	1.8	2.9	—	—	—	—
Nitrate + nitrite (expressed as N)	F	4	3	55	218	510	—	—	—	—
Nitrate + nitrite (expressed as N)	NF	4	3	76	224	510	—	—	—	—
Phosphorus (total)	F	4	2	130	130	130	—	—	—	—
Phosphorus (total)	NF	4	4	190	433	780	—	—	—	—
Potassium	F	4	4	4570	5408	6450	—	—	—	—
Potassium	NF	4	4	4620	5520	6440	—	—	—	—
Selenium	F	4	4	1.2	1.6	2.2	50	0/4	—	—
Selenium	NF	4	4	1.1	1.5	2.1	—	—	5	0/4
Silver	F	4	2	0.04	0.05	0.06	—	—	—	—
Silver	NF	4	0	—	—	—	—	—	—	—
Sodium	F	4	4	32400	33725	35600	—	—	—	—
Sodium	NF	4	4	32500	34325	35600	—	—	—	—
Sulfate	F	4	4	13000	16500	18000	—	—	—	—
Thallium	F	4	4	0.169	0.487	0.772	—	—	—	—
Thallium	NF	4	0	—	—	—	—	—	—	—
Total dissolved solids	NF	4	3	5400	9533	16000	—	—	—	—
Uranium	F	4	4	0.241	0.377	0.764	-	—	—	—
Uranium	NF	4	4	0.258	0.443	0.756	-	—	—	—

Table 3.0-1 (continued)

Analyte	Field Preparation	Number of Analyses	Number of Detects	Minimum of Detects (µg/L)	Mean of Detects (µg/L)	Maximum of Detects (µg/L)	NMED Livestock Watering Standard (µg/L)	Frequency of Detects > Livestock Watering Standard	NMED Wildlife Habitat Standard (µg/L)	Frequency of Detects > Wildlife Habitat Standard
Vanadium	F	4	4	0.8	1.4	2.2	100	0/4	—	—
Vanadium	NF	4	4	0.64	1.7	2.6	—	—	—	—
Zinc	F	4	0	—	—	—	25000	0/4	—	—
Zinc	NF	4	0	—	—	—	—	—	—	—

^a NMED = New Mexico Environment Department.

^b State of New Mexico surface water standards are from New Mexico Water Quality Control Commission Regulations, *Standards for Interstate and Intrastate Surface Waters*, 20 NMAC 6.1.

^c F = Filtered.

^d Value is not available or not applicable.

^e NF = Nonfiltered.

Table 3.0-2
Pueblo Canyon Surface Water Samples, June 2000: Data Summary for Radionuclides

Analyte	Field Preparation	Number of Analyses	Number of Detects	Minimum of Detects (pCi/L)	Mean of Detects (pCi/L)	Maximum of Detects (pCi/L)	NMED ^a Livestock Watering Standard ^b (pCi/L)	Frequency of Detects >NMED Livestock Watering Standard
Americium-241	F ^c	4	0	— ^d	—	—	—	—
Americium-241	NF ^e	4	0	—	—	—	—	—
Cesium-134	NF	4	0	—	—	—	—	—
Cesium-137	NF	4	0	—	—	—	—	—
Cobalt-60	NF	4	0	—	—	—	—	—
Europium-152	NF	4	0	—	—	—	—	—
Plutonium-238	F	4	0	—	—	—	—	—
Plutonium-238	NF	4	0	—	—	—	—	—
Plutonium-239	F	4	0	—	—	—	—	—
Plutonium-239	NF	4	1	0.057	0.057	0.057	—	—
Ruthenium-106	NF	4	0	—	—	—	—	—
Sodium-22	NF	4	0	—	—	—	—	—
Strontium-90	F	4	1	8.3	8.3	8.3	—	—
Strontium-90	NF	4	1	7.6	7.6	7.6	—	—
Tritium	NF	4	4	69	75	85	20000	0/4
Uranium-234	F	4	3	0.104	0.194	0.337	—	—
Uranium-234	NF	4	3	0.089	0.182	0.34	—	—

Table 3.0-2 (continued)

Analyte	Field Preparation	Number of Analyses	Number of Detects	Minimum of Detects (pCi/L)	Mean of Detects (pCi/L)	Maximum of Detects (pCi/L)	NMED Livestock Watering Standard (pCi/L)	Frequency of Detects >NMED Livestock Watering Standard
Uranium-235	F	4	0	—	—	—	—	—
Uranium-235	NF	4	0	—	—	—	—	—
Uranium-238	F	4	4	0.077	0.132	0.214	—	—
Uranium-238	NF	4	4	0.061	0.137	0.297	—	—

^a NMED = New Mexico Environment Department.

^b State of New Mexico surface water standards are from New Mexico Water Quality Control Commission Regulations, *Standards for Interstate and Intrastate Surface Waters*, 20 NMAC 6.1.

^c F = Filtered.

^d Value is not available or not applicable.

^e NF = Nonfiltered.